Micro-evidence on product and labor market regime differences between Chile and France

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Sabien Dobbelaere, Rodolfo Lauterbach and Jacques Mairesse

Maastricht Economic and social Research institute on Innovation and Technology (UNU-MERIT)
email: info@merit.unu.edu | website: http://www.merit.unu.edu

Maastricht Graduate School of Governance (MGSoG)
email: info-governance@maastrichtuniversity.nl | website: http://mgsog.merit.unu.edu

Keizer Karelplein 19, 6211 TC Maastricht, The Netherlands
Tel: (31) (43) 388 4400, Fax: (31) (43) 388 4499

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Micro-evidence on product and labor market regime differences between Chile and France*

Sabien DOBBELAERE[†] Rodolfo LAUTERBACH[‡] Jacques MAIRESSE[§]

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Abstract

Institutions, social norms and the nature of industrial relations vary greatly between Latin American and Western European countries. Such institutional and organizational differences might shape firms' operational environment in general and the type of competition in product and labor markets in particular. Contributing to the literature on estimating simultaneously product and labor market imperfections, this paper quantifies industry differences in both types of imperfections using firm-level data in Chile –a non-OECD member under the considered time period– and France. We rely on two extensions of Hall's econometric framework for estimating price-cost margins by nesting three labor market settings (perfect competition or right-to-manage bargaining, efficient bargaining and monopsony). Using an unbalanced panel of 1,737 firms over the period 1996-2003 in Chile containing unique data on firm-level output price indices and 14,270 firms over the period 1994-2001 in France, we first classify 20 comparable manufacturing industries in 6 distinct regimes that differ in the type of competition prevailing in product and labor markets. We then investigate industry differences in the estimated product and labor market imperfections. Consistent with differences in institutions and in the industrial relations system in the two countries, we find important regime differences across the two countries. In addition, we observe cross-country differences in the levels of product and labor market imperfections within regimes.

JEL classification : C23, D21, J51, L13.
Keywords : Rent sharing, monopsony, price-cost mark-ups, production function, panel data.

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[†]VU University Amsterdam, Tinbergen Institute and IZA. Corresponding author: *sabien.dobbelaere@vu.nl*.

[‡]National Innovation Council for Development (CNID) and UNU-MERIT (Maastricht University). Email: *rlauterbach@cnid.cl*.

[§]CREST (ParisTech-ENSAE), UNU-MERIT (Maastricht University) and NBER. Email: *Jacques.Mairesse@ensae.fr*.

1 Introduction

There is an abundant literature on production function estimation studying how firms convert inputs into outputs and the efficiency with which this occurs (see Syverson, 2011 for a survey). This literature as of late has given increasing attention to possible biases that market imperfections –particularly in the product market– could induce in production function and productivity estimates. There is a long tradition in applied industrial organization of estimating product market power (see De Loecker and Warzynski, 2012 for references). While most economists believe that product and labor market imperfections almost surely exist to one degree or another, only few have explicitly accounted for their joint influence on production function estimation at the micro level and existing analyses have been confined to OECD countries (see Dobbelaere and Mairesse, 2013 for references).

Contributing to the econometric literature on estimating simultaneously product market and labor market imperfections, this paper aims at identifying and quantifying industry differences in both types of imperfections in Chile –a non-OECD member under the considered time period[1]– and France. In particular, we first examine cross-country variation in the prevalence of regimes characterizing the type of competition prevailing in product and labor markets. We then investigate cross-industry heterogeneity in the degree of product and labor market imperfections within regimes. Relying on an econometric method that only requires firm-level data on production values, factor inputs and factor costs proves particularly useful to analyze important labor issues in a comparative setting. For example, our analysis allows to distinguish industries predominantly characterized by wage determination under trade unions from those predominantly typified by wage determination under oligopsonistic competition. As such, our analysis is capable of discerning whether either market power on the supply side or market power on the demand side is predominantly responsible for introducing allocative inefficiencies through distorting factor prices.

The Chilean-French comparison is motivated by the inherent institutional, organizational and cultural differences between the two countries. As part of the OECD accession process, competition law has been strengthened and regulatory policies –aimed at fostering market openness and competition– have been implemented in accordance with the OECD's Guiding Principles for Regulatory Quality and Performance (2005) in Chile during the last three decades (OECD, 2010). However, differences remain in the regulatory settings in Chile and France that our comparative study may confirm. For example, the OECD indicators of product market anti-competitive regulations show that regulations are higher in Chile, in particular as concerns administrative regulation which suffers from opacity and imposes burdens on startups (Wölfl *et al.*, 2010). In Chile, social stratification and legislation –tracing back to differences based on race, social status and ownership established during colonial times– have historically modelled industrial relations and continue to shape largely today's Chilean industrial relations system. Labor reforms, implemented during the 1990s, have not been sufficient to move away from the legacy of dictatorship (Durán-Palma *et al.*, 2005). Labor legislation continues to facilitate dismissal, unionization remains contested and employment relations are still based on authority, thereby promoting worker fear and insecurity (Rodríguez, 2010; Ronconi, 2012). Indeed, comparing Chile to France, the OECD indicators of employment protection indicate that employment protection is significantly higher in France, which is due to much stricter regulation on temporary contracts and to

[1] Chile became an OECD member on May 7, 2010 while the Chilean data in this study cover the period 1996-2003.

additional requirements for collective dismissals (Venn, 2009). The industrial relations system in Chile also explains why only 14% of employees are union members and only 24% of employees are covered by collective bargaining agreements, which are mostly concluded at the enterprise level. In terms of union membership, the French trade union movement is among the weakest in Europe, with an even lower proportion of employees in unions than in Chile (8%). French trade unions are divided into a number of rival confederations, competing for membership. However, union membership is not the only indicator of strength. Despite low membership and apparent division, French trade unions have repeatedly shown that they are able to mobilize workers in mass strikes and demonstrations to great effect. In France, negotiations are mostly held at the industry level which can be supplemented with bargaining agreements at the firm level. The fact that the government often extends the terms of industry-level agreements to all employers explains the very high collective bargaining coverage (95%). These institutional and organizational differences might shape firms' operational environment in general and –within our context– the type of competition in product and labor markets in particular. For example, given that industrial relations in France are characterized by a broadly regulated system of wage bargaining typified by the dominance of industry-level wage bargaining and the existence and widespread use of extension procedures for industry-level wage agreements and that French trade unions have shown to be powerful, we expect the proportion of industries typified by wage determination under trade unions to be larger in France compared to Chile.

Methodologically, our study implements the classification procedure developed in Dobbelaere and Mairesse (2013). This procedure is based on two extensions of a microeconomic version of Hall's (1988) framework for estimating price-cost margins that take into account two polar extremes of types of imperfections in the labor market that are both intuitively appealing and tractable: the efficient bargaining model (McDonald and Solow, 1981) –being one of the two canonical rent-sharing models – that allocates market power to employees through costs of firing, hiring and training, and the monopsony model (Manning, 2003) that allocates market power to employers through search frictions or heterogeneous worker preferences for job characteristics which generate upward sloping labor supply curves to individual firms (Booth, 2014). This classification procedure uses econometric production functions as a tool for testing the competitiveness of product and labor markets and evaluating their degree of imperfection. By considering two product market settings (perfect competition (PC) and imperfect competition (IC)) and three labor market settings (perfect competition or right-to-manage bargaining (PR), Nickell and Andrews, 1983, efficient bargaining (EB) and monopsony (MO)), it distinguishes six regimes characterizing the type of competition prevailing in product and labor markets.

Given the selection of our two countries, our analysis is related to Benavente *et al.* (2009), Dobbelaere *et al.* (2015) and Petrin and Sivadasan (2013). These studies are also based on the gap methodology which essentially starts from the observation that any factors that create misallocation of resources can be thought of as generating wedges in the first-order conditions of firm optimization problems. Using a sample of manufacturing firms in Belgium, Chile and France, Benavente *et al.* (2009) impose efficient bargaining on the data and estimate a Solow residual equation that gives estimates of average price-cost mark-up and rent-sharing parameters at the manufacturing level. Using a sample of manufacturing firms in France, Japan and the Netherlands, Dobbelaere *et al.* (2015) apply two distinct classification procedures –which deviate from the one in Dobbelaere and Mairesse (2013)– to investigate differences in revealed product and labor market settings at the industry level and to check the sensitivity of these settings to the choice of estimator. Using a sample of manufacturing plants in Chile, Petrin and Sivadasan (2013) estimate the gaps between an input's marginal product and its cost to infer the value of lost output arising from allocative efficiency at the manufacturing level. Our contribution differs from the aforementioned analyses in two respects. First, our study is the first to consistently compare the type and the degree of industry-level product and labor market imperfections inferred from consistent estimation of firm-level production functions in a Latin American country and a Western European country. Second, using a unique dataset containing firm-level output price indices, our microeconomic production function estimates for Chile are not subject to the omitted output price bias, as is often a major drawback in microeconometric studies of firm behavior.

Our empirical analysis is based on two unbalanced panels of manufacturing firms: 1,737 firms over the period 1996-2003 in Chile and 14,270 firms over the period 1994-2001 in France. Our analysis consists of two parts. In the first part, we classify 20 comparable manufacturing industries in each country according to the six distinct regimes prevailing in these industries. We observe considerable differences in the prevalent product and labor market settings and hence in the competitiveness regimes in the 20 industries. We find that imperfect competition in the product market is much more frequent in both countries than perfect competition and more so in France than in Chile, and that the most prevalent labor market setting is perfect competition or right-to-manage bargaining in Chile while it is efficient bargaining in France. In the second part, we investigate within-regime industry differences in the estimated product and labor market imperfection parameters in each country. In addition to the important cross-country regime differences that our analysis reveals, we also find differences in the levels of market imperfections within these two regimes.

We proceed as follows. Section 2 discusses the theoretical framework. Section 3 presents the firm panel data for Chile and France. Section 4 discusses the estimation method and the econometric implementation of our procedure to classify industries in distinct regimes characterizing the type of competition prevailing in product and labor markets. Section 5 reports the results of the classification procedure, investigating how industries in both countries differ in the nature of product and labor market imperfections and assesses industry differences in the degree of market imperfections within each regime. Section 6 concludes.

2 Theoretical framework

This section presents the main ingredients of our extension of Hall's (1988) framework for estimating price-cost margins, which does not assume perfect competition in the labor market but considers three labor market settings: perfect competition or right-to-manage bargaining, efficient bargaining and monopsony. For technical details, we refer to Dobbelaere and Mairesse (2013).

We start from a production function $Q_{it} = \Theta_{it} F(N_{it}, M_{it}, K_{it})$,where i is a firm index, t a time index, N is labor, M is material input and K is capital. $\Theta_{it} = Ae^{\eta_i + u_t + \upsilon_{it}}$, with η_i an unobserved firm-specific effect, u_t a year-specific intercept and υ_{it} a random component, is an index of technical change or "true" total factor productivity. Denoting the logarithm of Q_{it}, N_{it}, M_{it}, K_{it} and Θ_{it} by q_{it}, n_{it}, m_{it}, k_{it} and θ_{it} respectively, the logarithmic specification of the production function gives:

$$q_{it} = (\varepsilon_N^Q)_{it} n_{it} + (\varepsilon_M^Q)_{it} m_{it} + (\varepsilon_K^Q)_{it} k_{it} + \theta_{it} \tag{1}$$

where $(\varepsilon_J^Q)_{it}$ $(J = N, M, K)$ is the elasticity of output with respect to input factor J.

Firms operate under imperfect competition in the product market (IC). We allow for three labor market settings (LMS): perfect competition or right-to-manage bargaining (PR), efficient bargaining (EB) and monopsony (MO).[2] We assume that material input and labor are variable factors. Short-run profit maximization implies the following first-order condition with respect to material input:

$$(\varepsilon_M^Q)_{it} = \mu_{it}\,(\alpha_M)_{it} \tag{2}$$

where $(\alpha_M)_{it} = \frac{j_{it}M_{it}}{P_{it}Q_{it}}$ is the share of material costs in total revenue and $\mu_{it} = \frac{P_{it}}{(C_Q)_{it}}$ refers to the mark-up of output price P_{it} over marginal cost $(C_Q)_{it}$. Eq. (2) shows that the price-cost mark-up generates a wedge between the output elasticity of materials and the revenue share of materials.

Depending on the prevalent LMS, short-run profit maximization implies the following first-order condition with respect to labor:

$$\begin{aligned}
(\varepsilon_N^Q)_{it} &= \mu_{it}\,(\alpha_N)_{it} \qquad \text{if } LMS = PR & (3)\\
&= \mu_{it}\,(\alpha_N)_{it} - \mu_{it}\gamma_{it}\,[1 - (\alpha_N)_{it} - (\alpha_M)_{it}] \qquad \text{if } LMS = EB & (4)\\
&= \frac{\mu_{it}\,(\alpha_N)_{it}}{\beta_{it}} \qquad \text{if } LMS = MO & (5)
\end{aligned}$$

where $(\alpha_N)_{it} = \frac{w_{it}N_{it}}{P_{it}Q_{it}}$ is the share of labor costs in total revenue. $\gamma_{it} = \frac{\phi_{it}}{1-\phi_{it}}$ represents the relative extent of rent sharing, $\phi_{it} \in [0, 1]$ the absolute extent of rent sharing, $\beta_{it} = \frac{(\varepsilon_w^N)_{it}}{1+(\varepsilon_w^N)_{it}}$ and $(\varepsilon_w^N)_{it} \in \Re_+$ the wage elasticity of the labor supply. From the first-order conditions with respect to material input and labor, we can define a parameter of joint market imperfections (ψ_{it}) that is zero, positive or negative depending on the labor market setting:

$$\begin{aligned}
\psi_{it} &= \frac{(\varepsilon_M^Q)_{it}}{(\alpha_M)_{it}} - \frac{(\varepsilon_N^Q)_{it}}{(\alpha_N)_{it}} & (6)\\
&= 0 \qquad \text{if } LMS = PR & (7)\\
&= \mu_{it}\gamma_{it}\left[\frac{1 - (\alpha_N)_{it} - (\alpha_M)_{it}}{(\alpha_N)_{it}}\right] > 0 \qquad \text{if } LMS = EB & (8)\\
&= -\mu_{it}\frac{1}{(\varepsilon_w^N)_{it}} < 0 \qquad \text{if } LMS = MO & (9)
\end{aligned}$$

Eq. (6) clearly shows that our framework is based on the gap methodology. Indeed, from Eq. (6), it follows that the gap between the output elasticities of labor and materials and their revenue shares are key to identification of the product and labor market imperfection parameters. Intuitively, in a perfectly competitive labor market or in a right-to-manage bargaining setting, the marginal employee receives a real wage that equals his/her

[2] Our framework does not allow to disentangle perfect competition in the labor market from right-to-manage bargaining. In both settings, labor is unilaterally determined by the firm from profit maximization, i.e. the real wage equals the marginal product of labor.

marginal product. As such, the only source of discrepancy between the output elasticity of labor and the share of labor costs in revenue is the price-cost mark-up, just like in the materials market, yielding the value zero of the joint market imperfections parameter. In an efficient bargaining setting, the marginal employee gets a real wage that exceeds his/her marginal product since efficient bargaining allocates inframarginal gains across employees, yielding the positive value of the joint market imperfections parameter. In a monopsony setting, on the other hand, the marginal employee obtains a real wage that is less than his/her marginal product, yielding the negative value of the joint market imperfections parameter.

Once the relevant labor market setting is determined, the product and labor market imperfections parameters are derived from the joint market imperfections parameter (ψ_{it}): the price-cost mark-up and extent of rent-sharing parameters (μ_{it} and γ_{it}, respectively) if the efficient bargaining model prevails (see Eq. (8)) or the price-cost mark-up and labor supply elasticity parameters $\big(\mu_{it}$ and $(\varepsilon_w^N)_{it}$, respectively$\big)$ if the monopsony model prevails (see Eq. (9)). On the product market side, the price-cost mark-up measures the ability of firms to charge prices above marginal costs. On the labor market side, the absolute extent of rent-sharing parameter (ϕ_{it} which is directly derived from γ_{it}) measures the part of economic rents going to the workers or the degree of workers' bargaining power during worker-firm negotiations whereas the labor supply elasticity parameter measures the degree of wage setting power that firms possess.

Assuming constant returns to scale, the capital elasticity can be expressed as:

$$(\varepsilon_K^Q)_{it} = 1 - (\varepsilon_N^Q)_{it} - (\varepsilon_M^Q)_{it} \tag{10}$$

Inserting Eqs. (2), (6) and (10) in Eq. (1) and rearranging terms gives:

$$q_{it} = \mu_{it}\left[(\alpha_N)_{it}\,(n_{it} - k_{it}) + (\alpha_M)_{it}\,(m_{it} - k_{it})\right] + \psi_{it}(\alpha_N)_{it}\,(k_{it} - n_{it}) + \theta_{it} \tag{11}$$

Eq. (11) is the basis for the empirical estimation of our parameters of interest.

3 Data description

Our modified production function framework only requires data on production values, factor inputs and factor costs. This section presents the micro data in Chile and France.

The Chilean data are sourced from the ENIA ("Encuesta Nacional Industrial Anual") survey collected annually by INE ("Instituto Nacional de Estadisticas"). The French data are based on firm accounting information from EAE ("Enquête Annuelle d'Entreprise", "Service des Etudes et Statistiques Industrielles" (SESSI)). For both countries, our estimation sample is restricted to firms having at least four consecutive observations. After some trimming on input shares in total revenue and input growth rates to eliminate outliers and anomalies, we end up with an unbalanced panel of 1,737 firms over the period 1996-2003 in Chile (CH) and 14,270 firms spanning the period 1994-2001 in France (FR). Table A.1 in Appendix gives the panel structure of the estimation sample by country.

Output (Q) is defined as nominal sales divided by a firm-level price index based on the product-firm level annex from ENIA in CH and current production deflated by the two-digit producer price index in FR. Labor

(N) refers to the average number of employees in each firm for each year in CH and FR. Material input is defined as intermediate inputs –consisting of raw materials, elaborated materials, fuels and electricity– deflated by the two-digit intermediate inputs price index in CH and intermediate consumption deflated by the two-digit intermediate consumption price index in FR. The capital stock (K) is measured by the gross bookvalue of fixed assets at the beginning of the year in CH and FR. The shares of labor (α_N) and material input (α_M) are constructed by dividing respectively the firm total labor cost and undeflated intermediate consumption by the firm undeflated production and by taking the average of these ratios over adjacent years.

Table 1 reports the means, standard deviations and quartile values of our main variables by country. The average growth rate of real firm output is -0.4% per year in CH and 3.2% in FR.[3] In CH, labor and materials have decreased at an average annual growth rate of 1.8% and 1.9% respectively, while capital has increased at an average annual growth rate of 4.3%. In FR, labor and materials have increased at an average annual growth rate of 1.2% and 4.2% respectively, whereas capital has decreased at an average annual growth rate of 0.2%. The Solow residual or the conventional measure of total factor productivity (TFP) has been stable over the considered period in each country. As expected for firm-level data, the dispersion of all these variables is considerably large. For example, TFP growth is lower than -11.1% (-5.0%) for the first quartile of firms in CH (FR) and higher than 10.0% (6.3%) for the upper quartile in CH (FR).

<Insert Table 1 about here>

4 Econometric framework

4.1 Estimation method

We use econometric production functions as a tool for testing the competitiveness of product and labor markets and for assessing their degree of imperfection, not only for estimating factor elasticities and total factor productivity as has been common practice in the econometric literature on estimating microeconomic production functions.

Since our study aims at (i) comparing regime differences in terms of the type of competition prevailing in product and labor markets across CH and FR and (ii) assessing within-regime industry differences in the estimated product and labor market imperfection parameters in each country, we estimate *average* parameters:

$$q_{it} = \mu \left[\alpha_N \left(n_{it} - k_{it}\right) + \alpha_M \left(m_{it} - k_{it}\right)\right] + \psi \alpha_N \left(k_{it} - n_{it}\right) + u_t + \zeta_{it} \tag{12}$$

with $\zeta_{it} = \omega_{it} + \epsilon_{it}$. Of the error components, ω_{it} represents unobserved productivity to the econometrician but possible observed by the firm at t when input decisions are made (transmitted productivity shock), while ϵ_{it} captures all other sources of error or productivity that is not observed by the firm before making input choices at t. Our method of retrieving product and labor market imperfection parameters from the gap between the estimated *average* output elasticities of labor and materials and their *average* revenue shares

[3] The negative average real firm output growth rate in CH is due to a financial crisis that hit the Chilean manufacturing industries in 1998 and 1999. Real firm output decreased at an average growth rate of 2.1% and 7.3% in 1998 and 1999 respectively. Taking out the crisis years would yield an average growth rate of real firm output of 1.5% per year.

allows to wash out firm-level differences in adjustment costs which are temporary in nature, i.e. related to the business cycle.

The recent literature on production function estimation is dominated by two econometric approaches that differ in handling endogeneity of inputs and unobserved productivity in models linear in parameters. Intuitively, both approaches differ in the way they put assumptions on the economic environment that allow econometricians to exploit lagged input decisions as instruments for current input choices. The parametric generalized method of moments (GMM) approach relies on instrumental variables (IV). The semiparametric structural control function (CF) approach uses observed variables and economic theory to invert out productivity nonparametrically and hence to obtain an observable expression for productivity.[4] Since we are primarily interested in retrieving consistent production function coefficients based on two different micro datasets rather than an accurate measure of productivity, we judge the parametric *GMM* approach to be the most appropriate.

In particular, we rely on a general approach to estimating error components models designed for panels with few time periods and many individuals, covariates that are not strictly exogenous, unobserved heterogeneity, heteroskedasticity and autocorrelation within individuals, developed by Arellano and Bover (1995) and Blundell and Bond (1998) (*SYS-GMM* estimator). This approach extends the standard *(first-differenced) GMM* estimator of Arellano and Bond (1991) –which eliminates unobserved firm-specific effects by taking first differences– by relying on a richer set of orthogonal conditions.[5] The error components are an unobserved fixed effect (η_i), a possibly autoregressive productivity shock ($\omega_{it} = \rho\omega_{it-1} + \xi_{it}$ with $|\rho| < 1$) and serially uncorrelated measurement errors (ϵ_{it}), with $\xi_{it}, \epsilon_{it} \sim i.i.d.$ Consistent with our static theoretical framework, we estimate the restricted version of the Blundell-Bond model and only consider idiosyncratic productivity shocks (imposing $\rho = 0$). We apply the two-step *GMM* estimator which is asymptotically more efficient than the one-step *GMM* estimator and which is robust to whatever patterns of heteroskedasticity and cross-correlation. We use a finite-sample correction to the two-step covariance matrix developed by Windmeijer (2005). The validity of *GMM* crucially hinges on the assumption that the instruments are exogenous. We report both the Sargan and Hansen test statistics for the joint validity of the overidentifying restrictions. We build sets of instruments following the Holtz-Eakin *et al.* (1988)-approach which avoids the standard two-stage least squares trade-off between instrument lag depth and sample depth by including separate instruments for each time period and substituting zeros for missing observations. However, the *SYS-GMM* estimator might generate moment conditions prolifically with the instrument count quadratic in the time dimension of the panel. To avoid instrument proliferation, we only use 2- and 3-year lags of the instrumented variables as instruments in the first-differenced equation and the 1-year lag of the first-differenced instrumented variables as instruments in the original equation. In addition to the Hansen test evaluating the entire set of overidentifying restrictions/instruments, we provide difference-in-Hansen statistics to test the validity of subsets of instruments.

[4] Eberhardt and Helmers (2010) survey the most popular parametric and semiparametric estimators dealing with the transmission bias for Cobb-Douglas production functions.

[5] The Arellano-Bover/Blundell-Bond estimator assumes that the first differences of the instrumental variables are uncorrelated with the fixed effects, which allows the introduction of more instruments which might improve efficiency dramatically.

Besides the simultaneity bias, other important biases that emerge when estimating microeconomic production functions are (*i*) the output price bias, (*ii*) the bias arising from the unobserved allocation of inputs across products within multi-product firms and (*iii*) the bias arising from unobserved input prices with the source of input price variation across firms being quality differentiation (referred to as the input price bias) (De Loecker *et al.*, 2012).[6] If firms face downward-sloping demands, a negative correlation might arise between firm-level price deviations (from an average price index) and input choices. As a result, the output price bias could produce downwardly biased output elasticity estimates. As shown by De Loecker and Goldberg (2014), controlling for output price variation but ignoring input price variation could lead to downwardly biased (or even negative) output elasticity estimates. As the output price bias and the input price bias tend to work in opposite directions, not controlling for either output price or input price variation produces less biased output elasticity estimates. Realizing that our data comprise a set of industries characterized by substantial product differentiation and acknowledging that differentiated products require differentiated inputs, we ideally need to control for both output price and input price variation. Having information on firm-level output prices but lacking information on firm-level input prices for CH, hence, estimating a quantity production function that ignores input price variation, our output elasticity estimates could be downwardly biased. Lacking information on firm-level output prices and input prices for FR, our output elasticity estimates suffer from both the output price bias and the input price bias, with the net bias likely to be small.

In addition to the biases discussed so far, the presence of adjustment costs in inputs could also be a source of bias in our estimates. In particular, assuming that labor and materials are variable input factors free of adjustment costs (i.e. decided at production time when the productivity component ω_{it} is observed by the firm, but not by the econometrician) could generate an upward bias in the respective production function coefficients. However, by estimating *average* production function coefficients, we argue that this effect should be limited. Note that although our estimation method might wash out firm-level differences in adjustment costs which are temporary in nature, country- and industry-level differences in adjustment costs which are permanent/structural in nature might still remain.

4.2 Classification procedure

In each country, we consider 20 comparable industries making up our estimation sample. This decomposition is detailed enough for our purpose and ensures that each industry contains a sufficient number of observations (minimum: 104 observations for Other food products in CH and 929 for Rubber products in FR). Table A.2 in Appendix presents the industry repartition of the estimation sample and the number of firms and the number of observations by industry and country. For each industry $j \in \{1, \ldots, 20\}$, we estimate a standard Cobb-Douglas production function [Eq. (12)] using the *SYS-GMM* estimator.

The sign and statistical significance of the estimated industry-specific joint market imperfections parameter $\left(\widehat{\psi}_j\right)$ determines the regime characterizing the type of competition prevailing in the product and the labor market. *A priori*, 6 distinct regimes are possible: (*1*) perfect competition in the product market (PC) and

[6] Additional methodological issues that arise when estimating microeconomic production functions are selection bias/endogeneity of attrition and measurement error. To deal with these methodological issues, several estimators have been proposed (see Dobbelaere *et al.*, 2015 for a discussion).

perfect competition or right-to-manage bargaining in the labor market (PR), (*2*) imperfect competition in the product market (IC) and perfect competition or right-to-manage bargaining in the labor market (PR), (*3*) perfect competition in the product market (PC) and efficient bargaining in the labor market (EB), (*4*) imperfect competition in the product market (IC) and efficient bargaining in the labor market (EB), (*5*) perfect competition in the product market (PC) and monopsony in the labor market (MO) and (*6*) imperfect competition in the product market (IC) and monopsony in the labor market (MO). We denote the 6 possible regimes by $R \in \Re = \{PC\text{-}PR, IC\text{-}PR, PC\text{-}EB, IC\text{-}EB, PC\text{-}MO, IC\text{-}MO\}$.

We apply the classification procedure introduced in Dobbelaere and Mairesse (2013) to classify our manufacturing industries in $R \in \Re$. This classification procedure consists of two stages. In the *first stage*, we perform an F-test (explicit joint test) of the joint hypothesis $H_0 : \left(\mu_j - 1 = \frac{\left(\varepsilon_M^Q\right)_j}{\left(\alpha_M\right)_j} - 1\right) = \left(\psi_j = \frac{\left(\varepsilon_M^Q\right)_j}{\left(\alpha_M\right)_j} - \frac{\left(\varepsilon_N^Q\right)_j}{\left(\alpha_N\right)_j}\right) = 0$, where the alternative is that at least one of the parameters (the industry-specific price-cost mark-up μ_j minus 1, or the industry-specific joint market imperfections parameter ψ_j) does not equal zero. In other words, if H_0 is not rejected, that particular industry is characterized by the $PC\text{-}PR$-regime and if H_0 is rejected, it is not. Having selected the industries typified by the $PC\text{-}PR$-regime, we classify in the *second stage* of the procedure the remaining industries in one of the five other regimes by conducting two separate t-tests. For example, if our null hypothesis is $IC\text{-}EB$, we perform the following implicit joint test (or induced test) (Savin, 1984): $H_{10} : \left(\mu_j - 1\right) > 0$ and $H_{20} : \psi_j > 0$. The separate t-tests reject that the $IC\text{-}EB$-regime applies if either H_{10} or H_{20} is rejected. Since it is generally accepted that market imperfections are the norm, not the exception, we put *a priori* less weight on the $PC\text{-}PR$-regime by using the 10% statistical significance level instead of the conventional 5% level. More specifically, when testing $H_0 : \left(\mu_j - 1\right) = \psi_j = 0$ in the first stage of the classification procedure, we reject H_0 at the 10% level if the two-tailed p-value is less than 0.10. When testing $H_{10} : \left(\mu_j - 1\right) = 0$ against $H_{1a} : \left(\mu_j - 1\right) > 0$ in the second stage of the classification procedure, we reject H_{10} at the 10% level if $\left(\mu_j - 1\right) > 0$, i.e. corresponding to a two-tailed p-value less than 0.20. Likewise, for the test of $\psi_j > 0$ or $\psi_j < 0$, we reject $H_{20} : \psi_j = 0$ at the 10% level if the two-tailed p-value is less than 0.10.

5 Differences in the nature and the degree of market imperfections

Recall that the purpose of our study is twofold. *First*, analyzing whether there exist differences in regimes characterizing the type of competition prevailing in product and labor markets between CH and FR and checking whether our methodology allows to capture country-level differences in terms of institutions and the industrial relations system. This analysis is performed by implementing our classification procedure whose results are discussed in Section 5.1. *Second*, examining within-regime industry differences by (*i*) checking whether the observed cross-country regime differences are driven by important cross-country differences in the composition of industries making up the regime and (*ii*) investigating cross-industry heterogeneity in the degree of product and labor market imperfections within regimes. These results are discussed in Section 5.2. As such, Section 5.1 and the first part of Section 5.2 focuses on a cross-country comparison whilst the remainder of Section 5.2 has a cross-industry focus.

5.1 Prevalent regimes

Table 2 summarizes the resulting industry classification.[7] Columns 5 (CH) and 8 (FR) in Table A.2 in Appendix provide details on the specific industries belonging to each regime. Focusing on the product market side, 60% of the industries comprising 87% of the firms are typified by imperfect competition in CH whilst this holds for all industries in FR. On the labor market side, 80% of the industries comprising 47% of the firms are characterized by perfect competition or right-to-manage bargaining and 20% of the industries comprising 53% of the firms by efficient bargaining in CH. In FR, 60% of the industries comprising 73% of the firms are typified by efficient bargaining and 40% of the industries comprising 27% of the firms by perfect competition or right-to-manage bargaining. Hence, none of the industries is characterized by monopsony.

Taken together, the prevalent regimes in Chile are *IC-PR*, *PC-PR* and *IC-EB*:

- *IC-PR*-regime: 40% of the industries comprising 34% of the firms,
- *PC-PR*-regime: 40% of the industries comprising 12% of the firms and
- *IC-EB*-regime: 20% of the industries comprising 53% of the firms.

In France, the prevalent regimes are *IC-EB* and *IC-PR*:

- *IC-EB*-regime: 60% of the industries comprising 73% of the firms and
- *IC-PR*-regime: 40% of the industries comprising 27% of the firms.

<Insert Table 2 about here>

Summing up, our methodology allows to capture –to some extent– country-level institutional differences in terms of regulatory policy and the industrial relations system, which are structural in nature. We find that (*i*) imperfect competition in the product market is much more frequent in both countries than perfect competition and more so in FR than in CH and (*ii*) the most prevalent labor market setting is perfect competition or right-to-manage bargaining in CH and efficient bargaining in FR. As such, the dominant regime is one of imperfect competition in the product market and perfect competition or right-to-manage bargaining in the labor market in CH and one of imperfect competition in the product market and efficient bargaining in the labor market in FR.[8]

[7] Note that our procedure classifies *industries* in different regimes, implying that our interpretation of e.g. *IC-EB*-industries is that the representative firm is characterized by the same regime as the industry to which it belongs. Although we might expect that a majority of firms within an industry belongs to the same regime as that particular industry, regime differences across firms within a given industry are important, as we see for France in our previous work (Dobbelaere and Mairesse, 2013).

[8] To investigate whether differences in the industry classification between CH and FR are driven by differences in the choice of output price deflator, we compared the industry classification for CH using the firm-level price index to deflate nominal sales with the one using the same deflator as FR, i.e. the 2-digit industry price index. These results –which are not reported but available upon request– reveal minor differences in terms of industry classification. In particular, when using the 2-digit industry price index, we observe (*i*) a slight decrease in the proportion of industries characterized by PC in the product market (from 40% to 35%), (*ii*) a relatively small decrease in the proportion of industries characterized by PR in the labor market (from 80% to 70%), which translates into (*iii*) a relatively small increase in the proportion of industries characterized by EB (from 20% to 30%). From this sensitivity check, we conclude that the important regime differences between CH and FR are confirmed when using the 2-digit industry price index for CH: the most prevalent labor market setting is PR in CH while it is EB in FR. As such, *IC-PR* is the dominant regime in CH while *IC-EB* is the dominant regime in FR.

5.2 Within-regime industry differences

Are the cross-country regime differences that we confirmed in the previous section driven by cross-country differences in the composition of industries making up the regimes? To answer that question, we compare the relevant regime of each industry $j \in \{1, \ldots, 20\}$ across both countries (see columns 5 and 8 in Table A.2 in Appendix). Confirming within-regime industry heterogeneity across both countries, we observe that 65% (13 out of 20) of the manufacturing industries are characterized by a different regime. The four common IC-PR-industries are Textile, Leather goods and footwear, Rubber products, and Mineral products. The three common IC-EB-industries are Clothing and skin goods, Furniture, and Metal products and processing.

So far, we have concentrated on the *identification of the type* of competition prevailing in product and labor markets. As the degree of market failures is likely to vary across countries and across industries, we now focus on the *quantification* of market power in product and labor markets. This enables us to evaluate to which degree actual product and labor markets deviate from their perfectly competitive or economically efficient counterparts. From Section 2, it is clear that once the regime is determined, the product and labor market imperfections parameters are derived from the estimated joint market imperfections parameter $\widehat{\psi}_j$. Table 3 presents the industry mean and the industry quartile values of the SYS-GMM results within the prevalent regimes in each country. The left part of Table 3 reports the estimated joint market imperfections parameter and the right part the relevant product and labor market imperfection parameters, i.e. the price-cost mark-up within PC-PR and IC-PR, and the price-cost mark-up and the extent of rent sharing within IC-EB. The standard errors (σ) of $\widehat{\mu}_j$, $\widehat{\gamma}_j$ and $\widehat{\phi}_j$ are computed using the Delta method (Wooldridge, 2002).[9] All industry-specific estimates are presented in Table A.3 in Appendix. In addition to the parameters reported in Table 3, Table A.3 also reports the computed factor shares and the output elasticity estimates. In Table A.3, industries within the PC-PR- and IC-PR-regimes are ranked according to $\widehat{\mu}_j$ and industries within the IC-EB-regime according to $\widehat{\phi}_j$.

Let us focus the discussion on the primary parameters within each regime in CH and FR respectively. The prevalent regimes in CH are IC-PR (40% of industries/34% of firms), PC-PR (40% of industries/12% of firms) and IC-EB (20% of industries/53% of firms).

- Within regime $R = IC$-PR in CH, $\widehat{\mu}_j$ is lower than 1.199 for industries in the first quartile and higher than 1.592 for industries in the upper quartile. The median value of $\widehat{\mu}_j$ is estimated at 1.397.
- Within regime $R = PC$-PR in CH, $\widehat{\mu}_j$ is lower than 1.007 for industries in the first quartile and higher than 1.329 for industries in the third quartile. The median value of $\widehat{\mu}_j$ is estimated at 1.198.
- Within $R = IC$-EB in CH, $\widehat{\psi}_j$ is lower than 0.800 for industries in the first quartile and higher than 1.115 for industries in the third quartile. The corresponding $\widehat{\mu}_j$ is lower than 1.403 for the first quartile

[9] Dropping subscript j, $\widehat{\mu}$, $\widehat{\gamma}$ and $\widehat{\phi}$ are derived as follows: $\widehat{\mu} = \frac{\widehat{\varepsilon}_M^Q}{\alpha_M}$, $\widehat{\gamma} = \frac{\widehat{\varepsilon}_N^Q - \left(\widehat{\varepsilon}_M^Q \frac{\alpha_N}{\alpha_M}\right)}{\frac{\widehat{\varepsilon}_M^Q}{\alpha_M}(\alpha_N + \alpha_M - 1)}$ and $\widehat{\phi} = \frac{\widehat{\gamma}}{1+\widehat{\gamma}}$. Their respective standard errors are computed as: $(\sigma_{\widehat{\mu}})^2 = \frac{1}{(\alpha_M)^2}\left(\sigma_{\widehat{\varepsilon}_M^Q}\right)^2$, $(\sigma_{\widehat{\gamma}})^2 = \left(\frac{\alpha_M}{\alpha_N+\alpha_M-1}\right)^2 \frac{\left(\widehat{\varepsilon}_M^Q\right)^2\left(\sigma_{\widehat{\varepsilon}_N^Q}\right)^2 - 2\widehat{\varepsilon}_N^Q\widehat{\varepsilon}_M^Q\left(\sigma_{\widehat{\varepsilon}_N^Q,\widehat{\varepsilon}_M^Q}\right) + \left(\widehat{\varepsilon}_N^Q\right)^2\left(\sigma_{\widehat{\varepsilon}_N^Q}\right)^2}{\left(\widehat{\varepsilon}_M^Q\right)^4}$ and $\left(\sigma_{\widehat{\phi}}\right)^2 = \frac{(\sigma_{\widehat{\gamma}})^2}{(1+\widehat{\gamma})^4}$.

of industries and higher than 1.633 for the top quartile. The corresponding $\widehat{\phi}_j$ is estimated to be lower than 0.237 for industries in the first quartile and higher than 0.306 for industries in the upper quartile. The median values of $\widehat{\psi}_j$, $\widehat{\mu}_j$ and $\widehat{\phi}_j$ are estimated at 0.904, 1.543 and 0.287 respectively.

The prevalent regimes in FR are IC-EB (60% of industries/73% of firms) and IC-PR (40% of industries/27% of firms).

- Within $R = IC$-EB in FR, $\widehat{\psi}_j$ is lower than 0.473 for industries in the first quartile and higher than 0.712 for industries in the third quartile. The corresponding $\widehat{\mu}_j$ is lower than 1.344 for the first quartile of industries and higher than 1.471 for the top quartile. The corresponding $\widehat{\phi}_j$ is estimated to be lower than 0.383 for industries in the first quartile and higher than 0.489 for industries in the upper quartile. The median values of $\widehat{\psi}_j$, $\widehat{\mu}_j$ and $\widehat{\phi}_j$ are estimated at 0.651, 1.378 and 0.431 respectively.
- Within regime $R = IC$-PR in FR, $\widehat{\mu}_j$ is lower than 1.244 for industries in the first quartile and higher than 1.427 for industries in the upper quartile. The median value of $\widehat{\mu}_j$ is estimated at 1.306.

<Insert Table 3 about here>

Given that we have provided evidence of compositional variation in regimes across countries, we expect *a priori* to observe differences in the degree of market imperfection parameters across countries within a particular regime. Confirming this expectation for the IC-EB-regime, the median price-cost mark-up is estimated to be significantly higher in CH (1.543 compared to 1.378 in FR) whilst the median absolute extent of rent sharing is estimated to be significantly higher in FR (0.431 compared to 0.287 in CH). However, we do not detect a statistically significant cross-country difference in the median product imperfection parameter within the IC-PR-regime.

Existing empirical studies –relying on either the same or a simplified version of our theoretical model– have found that product and labor market imperfections are likely to go hand in hand by documenting a positive correlation between the estimated price-cost mark-up and the estimated extent of rent sharing in the cross-section dimension (see Dobbelaere, 2004; Boulhol *et al.*, 2011 and Dobbelaere and Mairesse, 2013). Corroborative evidence is provided by several OECD studies indicating that (i) there is a positive correlation between product market regulation and industry wage mark-ups (OECD, 2001) and (ii) product and labor market deregulations are correlated across countries (e.g. Brandt *et al.*, 2005). Supporting evidence is also given by Ebell and Haefke (2006) who argue that the strong decline in coverage and unionization in the UK and the US might have been a direct consequence of product market reforms of the early 1980s and by Boulhol (2009) who develops a theoretical model formalizing the idea that trade and capital market liberalization put pressure on labor market institutions leading to deregulation. Do we observe any relationship between product and labor imperfections in the two countries under consideration? To get a first insight, Table A.4 in Appendix reports correlations between product and labor market imperfection parameters for all industries and for the IC-EB-regime in each of the two countries. Two types of correlations between $\widehat{\mu}_j$ and $\widehat{\gamma}_j$ / $\widehat{\mu}_j$ and $\widehat{\beta}_j$ are reported: Spearman's rank correlation coefficients and biweight midcorrelation coefficients. The latter, which is based on Wilcox (2005), gives a correlation that is less sensitive to outliers and therefore more robust. Considering all industries, we observe a significant and strong correlation (of more than 0.6) between either $\widehat{\mu}_j$ and $\widehat{\gamma}_j$ or $\widehat{\mu}_j$ and $\widehat{\beta}_j$ in both CH and FR. This holds for both types of correlation coefficients. Within the IC-EB-regime, we find a significant robust correlation of 0.48 (0.77) between $\widehat{\mu}_j$ and $\widehat{\gamma}_j$ in CH (FR). A visual representation is given in Graphs 1-2. Each graph corresponds to one country. The first two panels in each graph focus on all industries, whereas the last panel in each graph focuses on the IC-EB-regime. The dashed lines denote the median values of the product and labor market imperfection parameters.

<Insert Graphs 1-2 about here>

6 Conclusion

This paper starts from the belief that product and labor markets are intrinsically characterized by imperfections and by the fact that variable input factors' estimated marginal products are not equal to their measured payments. There are a number of reasons why the latter discrepancy could exist. Paramount among these are economic factors like imperfections in product and/or factor markets, variable factor utilization, factor adjustment costs and measurement issues. Focusing on the former, this paper investigates how different manufacturing industries in Chile and France are in their factor shares, in their marginal products and in their imperfections in the product and labor markets in which they operate. Allowing for three labor market settings (perfect competition or right-to-manage bargaining, efficient bargaining and monopsony), we rely on two extensions of Hall's econometric framework for estimating price-cost margins. Using an unbalanced panel of 1,737 firms over the period 1996-2003 in Chile and 14,270 firms over the period 1994-2001 in France, we first determine the prevalent product market and labor market settings, and hence the prevalent regime, in 20 comparable manufacturing industries. We then investigate industry differences in the estimated product and labor market imperfection parameters within the prevalent regimes in each country.

Institutions, social norms and the nature of industrial relations vary greatly between Latin American countries and Western European countries. In Chile, practices continue to favor employers as evidenced by the easiness with which employers can hire or dismiss employees and by employers' decision-making power during the process of collective bargaining, and unionization remains contested. In contrast, industrial relations in France are characterized by a broadly regulated system of wage bargaining typified by the dominance of industry-level wage bargaining and the widespread use of extension procedures for industry-level wage agreements. These differences in the industrial relations system in the two countries are reflected in our results. Indeed, our analysis provides evidence of important regime differences at the detailed industry level across Chile and France. The dominant regime in Chile is one of imperfect competition in the product market and perfect competition or right-to-manage bargaining in the labor market (IC-PR). The median price-cost mark-up in the IC-PR-industries is about 1.40. In France, the dominant regime is imperfect competition in the product market and efficient bargaining in the labor market (IC-EB). The median price-cost mark-up and absolute extent of rent-sharing parameters in the IC-EB-industries are about 1.38 and 0.43 respectively. Our study also reveals cross-country differences in the levels of product and labor market imperfections within regimes. Within the IC-EB-regime, product market imperfections are estimated to be the highest in Chile while labor market imperfections are estimated to the highest in France.

The main message of our results is that despite the implementation of regulatory policies aimed at increasing competition in Chile and France, actual product and labor markets still deviate considerably from their economically efficient counterparts. Given that the recent misallocation literature has now well established the important role of misallocation of resources across productive units in explaining aggregate outcomes, this finding together with our evidence of cross-country cross-industry heterogeneity in terms of allocative efficiency might explain to some extent the sizeable variation in total factor productivity across our two countries and selected industries.

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Table 1: Descriptive statistics by country

CHILE (1996-2003)						
Variables	Mean	Sd.	Q_1	Q_2	Q_3	N
Real firm output growth rate Δq_{it}	-0.004	0.216	-0.123	-0.004	0.120	9,960
Labor growth rate Δn_{it}	-0.018	0.160	-0.095	0.000	0.057	9,960
Materials growth rate Δm_{it}	-0.019	0.281	-0.185	-0.016	0.146	9,960
Capital growth rate Δk_{it}	0.043	0.101	0.000	0.006	0.052	9,960
$(\alpha_N)_j(\Delta n_{it} - \Delta k_{it}) + (\alpha_M)_j(\Delta m_{it} - \Delta k_{it})$	-0.042	0.155	-0.132	-0.038	0.052	9,960
$(\alpha_N)_j(\Delta k_{it} - \Delta n_{it})$	0.011	0.030	-0.004	0.008	0.025	9,960
SR_{it}	-0.006	0.175	-0.111	-0.005	0.100	9,960
Labor share in nominal output $(\alpha_N)_i$	0.172	0.080	0.114	0.164	0.216	11,697
Materials share in nominal output $(\alpha_M)_i$	0.497	0.142	0.390	0.497	0.597	11,697
$1 - (\alpha_N)_i - (\alpha_M)_i$	0.330	0.118	0.245	0.326	0.415	11,697
FRANCE (1994-2001)						
Variables	Mean	Sd.	Q_1	Q_2	Q_3	N
Real firm output growth rate Δq_{it}	0.032	0.153	-0.051	0.030	0.114	98,322
Labor growth rate Δn_{it}	0.012	0.130	-0.039	0.000	0.064	98,322
Materials growth rate Δm_{it}	0.042	0.191	-0.059	0.038	0.141	98,322
Capital growth rate Δk_{it}	-0.002	0.161	-0.077	-0.021	0.066	98,322
$(\alpha_N)_j(\Delta n_{it} - \Delta k_{it}) + (\alpha_M)_j(\Delta m_{it} - \Delta k_{it})$	0.027	0.155	-0.056	0.028	0.110	98,322
$(\alpha_N)_j(\Delta k_{it} - \Delta n_{it})$	-0.005	0.057	-0.031	-0.006	0.022	98,322
SR_{it}	0.006	0.100	-0.050	0.007	0.063	98,322
Labor share in nominal output $(\alpha_N)_i$	0.311	0.132	0.216	0.298	0.390	99,839
Materials share in nominal output $(\alpha_M)_i$	0.517	0.143	0.427	0.523	0.617	99,839
$1 - (\alpha_N)_i - (\alpha_M)_i$	0.171	0.096	0.103	0.147	0.211	99,839

Note: $SR_{it} = \Delta q_{it} - (\alpha_N)_j \Delta n_{it} - (\alpha_M)_j \Delta m_{it} - [1 - (\alpha_N)_j - (\alpha_M)_j]\Delta k_{it}$.

Table 2: Industry classification by country

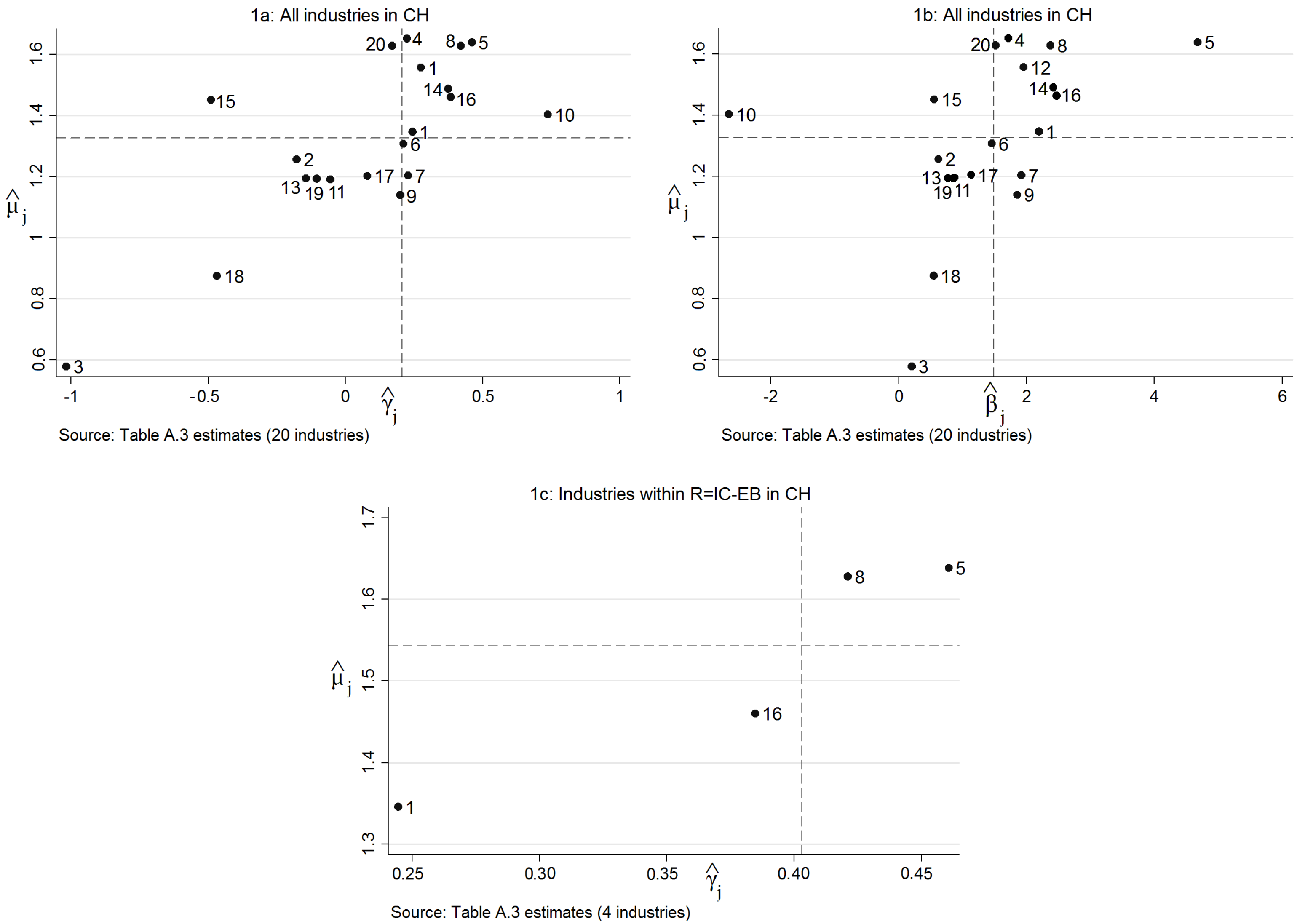
# ind. prop. of ind. (%) prop. of firms (%)	LABOR MARKET SETTING							
PRODUCT MARKET SETTING	**PR**		**EB**		**MO**			
	CH	FR	CH	FR	CH	FR	CH	FR
PC	8	0	0	0	0	0	8	0
	40.0	0	0	0	0	0	40.0	0
	12.5	0	0	0	0	0	12.5	0
IC	8	8	4	12	0	0	12	20
	40.0	40.0	20.0	60.0	0	0	60.0	100
	34.5	27.0	52.9	73.0	0	0	87.4	100
	16	8	4	12	0	0	20	20
	80.0	40.0	20.0	60.0	0	0	100	100
	47.0	27.0	52.9	73.0	0	0	100	100

Table 3: Industry-specific joint market imperfections parameter $\widehat{\psi}_j$, and corresponding price-cost mark-up $\widehat{\mu}_j$ and absolute extent of rent sharing $\widehat{\phi}_j$ by country

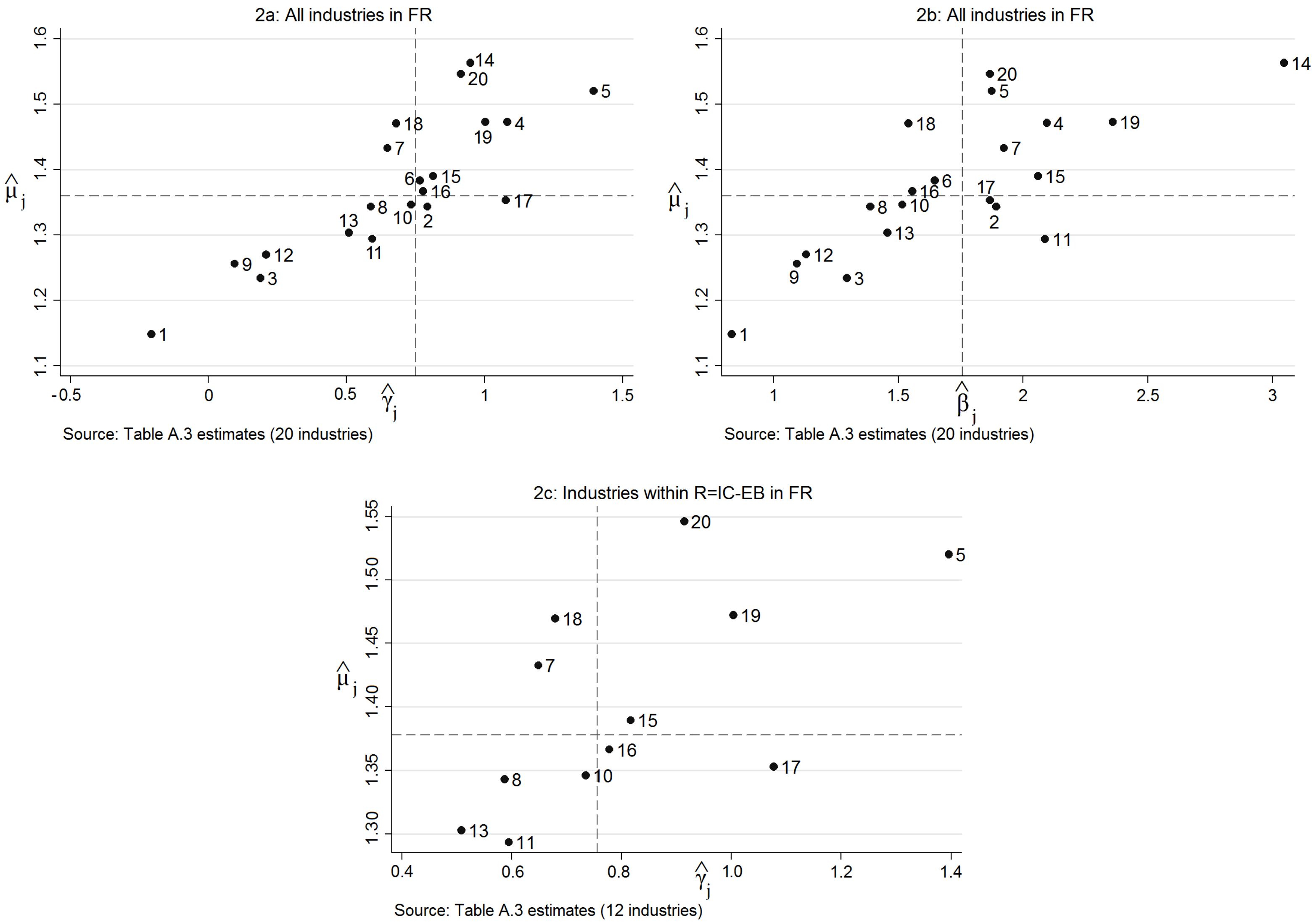
CHILE				
Regime $R = IC\text{-}PR$ **[40% of industries, 34% of firms]**	$\widehat{\psi}_j$	$\widehat{\mu}_j$		
Industry mean	0.422 (0.864)	1.402 (0.192)		
Industry Q_1	0.127 (0.564)	1.199 (0.112)		
Industry Q_2	0.567 (0.660)	1.397 (0.148)		
Industry Q_3	0.728 (0.856)	1.592 (0.274)		
Regime $R = PC\text{-}PR$ **[40% of industries, 12% of firms]**	$\widehat{\psi}_j$	$\widehat{\mu}_j$		
Industry mean	-0.311 (1.823)	1.137 (0.382)		
Industry Q_1	-0.964 (0.942)	1.007 (0.283)		
Industry Q_2	-0.458 (1.576)	1.198 (0.384)		
Industry Q_3	0.334 (2.680)	1.329 (0.489)		
Regime $R = IC\text{-}EB$ **[20% of industries, 53% of firms]**	$\widehat{\psi}_j$	$\widehat{\mu}_j$	$\widehat{\gamma}_j$	$\widehat{\phi}_j$
Industry mean	0.957 (0.476)	1.518 (0.138)	0.378 (0.158)	0.271 (0.082)
Industry Q_1	0.800 (0.343)	1.403 (0.107)	0.315 (0.117)	0.237 (0.066)
Industry Q_2	0.904 (0.409)	1.543 (0.134)	0.403 (0.149)	0.287 (0.081)
Industry Q_3	1.115 (0.609)	1.633 (0.169)	0.441 (0.199)	0.306 (0.098)
FRANCE				
Regime $R = IC\text{-}EB$ **[60% of industries, 73% of firms]**	$\widehat{\psi}_j$	$\widehat{\mu}_j$	$\widehat{\gamma}_j$	$\widehat{\phi}_j$
Industry mean	0.602 (0.153)	1.403 (0.057)	0.812 (0.179)	0.439 (0.057)
Industry Q_1	0.473 (0.124)	1.344 (0.046)	0.622 (0.139)	0.383 (0.041)
Industry Q_2	0.651 (0.149)	1.378 (0.058)	0.756 (0.169)	0.431 (0.054)
Industry Q_3	0.712 (0.193)	1.471 (0.069)	0.959 (0.218)	0.489 (0.066)
Regime $R = IC\text{-}PR$ **[40% of industries, 27% of firms]**	$\widehat{\psi}_j$	$\widehat{\mu}_j$		
Industry mean	0.413 (0.263)	1.333 (0.087)		
Industry Q_1	0.127 (0.164)	1.244 (0.056)		
Industry Q_2	0.412 (0.259)	1.306 (0.090)		
Industry Q_3	0.701 (0.303)	1.427 (0.120)		

Notes: Robust standard errors in parentheses. Detailed information on the industry-specific estimates is presented in Table A.3 in Appendix.

Graph 1: Product and labor market imperfection parameters in Chile



Graph 2: Product and labor market imperfection parameters in France



Appendix: Statistical annex

Table A.1: Panel structure: Number of observations per firm by country

	CHILE				FRANCE			
# participations$^{a)}$	**# obs.**	%	**# firms**	%	**# obs.**	%	**# firms**	%
4	884	7.56	221	12.72	4,164	4.17	1,041	7.30
5	770	6.58	154	8.87	7,150	7.16	1,430	10.02
6	1,278	10.93	213	12.26	12,804	12.82	2,134	14.95
7	2,989	25.55	427	24.58	11,193	11.21	1,599	11.21
8	5,776	49.38	722	41.57	64,528	64.63	8,066	56.52
Total	11,697	100.0	1,737	100.0	99,839	100.0	14,270	100.0

Note: a) Median number of observations per firm: 7 [CH] and 8 [FR].

Table A.2: Industry repartition by country

		CHILE			FRANCE		
Ind. j	Name	Code - CIIU[a)]	# Firms (# Obs.)	Regime R	Code - NES 114[b)]	# Firms (# Obs.)	Regime R
1	Food	311	580 (3,926)	*IC-EB*	B01-B02, B04	746 (5,211)	*IC-PR*
2	Other food products	312	16 (104)	*PC-PR*	B05-B06	800 (5,492)	*IC-PR*
3	Beverages	313	17 (121)	*PC-PR*	B03	145 (997)	*IC-PR*
4	Textile	321	120 (830)	*IC-PR*	F21-F32	710 (4,963)	*IC-PR*
5	Clothing and skin goods	322	108 (717)	*IC-EB*	C11	606 (3,980)	*IC-EB*
6	Leather goods and footwear	323-324	72 (477)	*IC-PR*	C12	244 (1,681)	*IC-PR*
7	Wooden products	331	110 (735)	*IC-PR*	F31	665 (4,679)	*IC-EB*
8	Furniture	332	60 (389)	*IC-EB*	C41	448 (3,224)	*IC-EB*
9	Paper, paper products	341	37 (237)	*PC-PR*	F32-F33	429 (3,017)	*IC-PR*
10	Publishing, (re)printing	342	35 (222)	*PC-PR*	C20	990 (6,715)	*IC-EB*
11	Chemical products	351-352, 354	70 (495)	*IC-PR*	C31-C32, F41-F43	675 (4,745)	*IC-EB*
12	Rubber products	355	27 (189)	*IC-PR*	F45	129 (929)	*IC-PR*
13	Plastics processing	356	106 (741)	*IC-PR*	F46	914 (6,432)	*IC-EB*
14	Mineral products	361-362, 369	59 (377)	*IC-PR*	F13-F14	644 (4,572)	*IC-PR*
15	Metallurgy	371-372	18 (130)	*PC-PR*	F51-F53	321 (2,328)	*IC-EB*
16	Metal products, metal processing	381	171 (1,132)	*IC-EB*	E21-E22, F54-F56	2,803 (19,794)	*IC-EB*
17	Machinery	382	37 (255)	*PC-PR*	E24-E28	966 (6,727)	*IC-EB*
18	Electrical machinery, electrical equipment	383	22 (144)	*PC-PR*	C44-C46, E32-E33, F61-F62	798 (5,641)	*IC-EB*
19	Transport equipment	384	36 (239)	*PC-PR*	D01-D02, E11-E13	691 (4,927)	*IC-EB*
20	Other manufacturing industries	385, 390	36 (237)	*IC-PR*	C42-C43, E34-E35	546 (3,785)	*IC-EB*

Notes: a) CIIU: Chilean industrial classification, equivalent to the International Standard Industry Classification (ISIC), Rev. 2.
b) NES 114: French industrial classification, "Nomenclature Economique de Synthèse - Niveau 3".

Table A.3: Industry-specific input shares $(\alpha_J)_j$ $(J = N, M, K)$, output elasticities $\left(\widehat{\varepsilon}_J^Q\right)_j$, joint market imperfections parameter $\widehat{\psi}_j$, and corresponding price-cost mark-up $\widehat{\mu}_j$ and absolute extent of rent sharing $\widehat{\phi}_j$ by country

CHILE

Regime $R = IC\text{-}PR$ [40% of industries, 34% of firms]

Ind. j	$(\alpha_N)_j$	$(\alpha_M)_j$	$(\alpha_K)_j$	$(\widehat{\varepsilon}_N^Q)_j$	$(\widehat{\varepsilon}_M^Q)_j$	$(\widehat{\varepsilon}_K^Q)_j$	$\widehat{\psi}_j$	$\widehat{\mu}_j$	*Sargan*	*Hansen*	*Dif-Hansen (lev)*	*Dif-Hansen (L2-dif)*	*Dif-Hansen (L3-dif)*	*m1*	*m2*
13	0.164	0.513	0.323	0.251 (0.042)	0.612 (0.059)	0.137 (0.038)	-0.340 (0.351)	1.194 (0.115)	0.000	0.170	0.716	0.268	0.156	-4.65	0.68
11	0.148	0.489	0.362	0.200 (0.070)	0.585 (0.048)	0.215 (0.061)	-0.156 (0.530)	1.195 (0.098)	0.000	0.637	0.157	0.811	0.906	-3.16	-0.30
7	0.147	0.547	0.306	0.092 (0.079)	0.658 (0.060)	0.251 (0.071)	0.577 (0.598)	1.203 (0.109)	0.000	0.155	0.247	0.636	0.573	-3.90	0.81
6	0.178	0.560	0.263	0.159 (0.128)	0.732 (0.081)	0.109 (0.104)	0.410 (0.815)	1.307 (0.145)	0.000	0.649	0.963	0.963	0.995	-3.99	-0.50
14	0.225	0.426	0.350	0.138 (0.099)	0.633 (0.081)	0.229 (0.065)	0.872 (0.599)	1.487 (0.190)	0.000	0.869	0.996	0.998	1.000	-1.93	-0.73
12	0.200	0.446	0.354	0.159 (0.452)	0.694 (0.166)	0.147 (0.433)	0.760 (2.398)	1.556 (0.371)	0.000	1.000	1.000	1.000	0.998	-2.59	0.35
20	0.201	0.399	0.400	0.215 (0.153)	0.649 (0.143)	0.136 (0.191)	0.556 (0.897)	1.628 (0.357)	0.000	1.000	1.000	1.000	1.000	-1.65	-1.17
4	0.169	0.513	0.318	0.161 (0.107)	0.847 (0.078)	-0.008 (0.095)	0.696 (0.722)	1.650 (0.152)	0.000	0.212	0.078	0.142	0.131	-4.65	0.54

Regime $R = PC\text{-}PR$ [40% of industries, 12% of firms]

Ind. j	$(\alpha_N)_j$	$(\alpha_M)_j$	$(\alpha_K)_j$	$(\widehat{\varepsilon}_N^Q)_j$	$(\widehat{\varepsilon}_M^Q)_j$	$(\widehat{\varepsilon}_K^Q)_j$	$\widehat{\psi}_j$	$\widehat{\mu}_j$	*Sargan*	*Hansen*	*Dif-Hansen (lev)*	*Dif-Hansen (L2-dif)*	*Dif-Hansen (L3-dif)*	*m1*	*m2*
3	0.108	0.479	0.413	0.306 (0.368)	0.277 (0.244)	0.417 (0.368)	-2.249 (3.602)	0.578 (0.510)	0.000	1.000	1.000	1.000	1.000	-1.95	1.04
18	0.196	0.458	0.346	0.313 (0.235)	0.401 (0.201)	0.286 (0.235)	-0.722 (1.450)	0.875 (0.439)	0.000	1.000	1.000	1.000	1.000	-1.45	-0.08
9	0.150	0.506	0.344	0.092 (0.079)	0.577 (0.118)	0.331 (0.079)	0.525 (0.705)	1.140 (0.233)	0.000	1.000	1.000	1.000	1.000	-1.99	-0.99
19	0.213	0.462	0.325	0.295 (0.194)	0.552 (0.144)	0.153 (0.194)	-0.194 (1.179)	1.194 (0.313)	0.000	1.000	1.000	1.000	1.000	-1.16	0.44
17	0.240	0.400	0.361	0.254 (0.093)	0.480 (0.101)	0.266 (0.093)	0.143 (0.586)	1.201 (0.253)	0.000	1.000	1.000	1.000	1.000	-1.87	-1.68
2	0.104	0.540	0.356	0.211 (0.312)	0.678 (0.178)	0.111 (0.312)	-0.763 (2.995)	1.256 (0.329)	0.000	1.000	1.000	1.000	1.000	-2.11	0.27
10	0.206	0.410	0.384	-0.109 (0.275)	0.575 (0.198)	0.534 (0.275)	1.932 (1.702)	1.403 (0.482)	0.000	1.000	1.000	1.000	1.000	-2.47	0.33
15	0.205	0.460	0.336	0.535 (0.557)	0.667 (0.228)	-0.202 (0.557)	-1.164 (2.364)	1.451 (0.495)	0.000	1.000	1.000	1.000	1.000	-2.03	1.14

Regime $R = IC\text{-}EB$ [20% of industries, 53% of firms]

Ind. j	$(\alpha_N)_j$	$(\alpha_M)_j$	$(\alpha_K)_j$	$(\widehat{\varepsilon}_N^Q)_j$	$(\widehat{\varepsilon}_M^Q)_j$	$(\widehat{\varepsilon}_K^Q)_j$	$\widehat{\psi}_j$	$\widehat{\mu}_j$	$\widehat{\gamma}_j$	$\widehat{\phi}_j$	*Sargan*	*Hansen*	*Dif-Hansen (lev)*	*Dif-Hansen (L2-dif)*	*Dif-Hansen (L3-dif)*	*m1*	*m2*
1	0.149	0.519	0.332	0.091 (0.046)	0.698 (0.051)	0.210 (0.052)	0.732 (0.363)	1.346 (0.099)	0.245 (0.111)	0.197 (0.071)	0.000	0.000	0.000	0.801	0.486	-9.16	-0.63
16	0.207	0.473	0.320	0.123 (0.073)	0.690 (0.072)	0.187 (0.070)	0.867 (0.454)	1.460 (0.152)	0.385 (0.173)	0.278 (0.090)	0.000	0.005	0.000	0.435	0.731	-4.71	-0.39
8	0.212	0.497	0.291	0.145 (0.053)	0.809 (0.058)	0.045 (0.058)	0.942 (0.322)	1.627 (0.116)	0.421 (0.124)	0.296 (0.061)	0.000	0.909	0.998	1.000	1.000	-4.12	-1.27
5	0.199	0.462	0.339	0.070 (0.118)	0.757 (0.086)	0.174 (0.057)	1.288 (0.763)	1.638 (0.186)	0.461 (0.225)	0.315 (0.105)	0.000	0.206	0.041	0.801	0.948	-4.27	0.07

Table A.3 (ctd): Industry-specific input shares $(\alpha_J)_j$ $(J = N, M, K)$, output elasticities $\left(\widehat{\varepsilon}_J^Q\right)_j$, joint market imperfections parameter $\widehat{\psi}_j$, and corresponding price-cost mark-up $\widehat{\mu}_j$ and absolute extent of rent sharing $\widehat{\phi}_j$ by country

FRANCE

Regime $R = IC\text{-}EB$ [60% of industries, 73% of firms]

Ind. j	$(\alpha_N)_j$	$(\alpha_M)_j$	$(\alpha_K)_j$	$(\widehat{\varepsilon}_N^Q)_j$	$(\widehat{\varepsilon}_M^Q)_j$	$(\widehat{\varepsilon}_K^Q)_j$	$\widehat{\psi}_j$	$\widehat{\mu}_j$	$\widehat{\gamma}_j$	$\widehat{\phi}_j$	*Sargan*	*Hansen*	*Dif-Hansen (lev)*	*Dif-Hansen (L2-dif)*	*Dif-Hansen (L3-dif)*	*m1*	*m2*
13	0.271	0.563	0.323	0.242 (0.025)	0.733 (0.025)	0.025 (0.017)	0.408 (0.130)	1.303 (0.044)	0.509 (0.147)	0.337 (0.130)	0.000	0.000	0.000	0.002	0.139	-10.30	-2.19
8	0.315	0.535	0.362	0.305 (0.045)	0.719 (0.038)	-0.023 (0.028)	0.376 (0.202)	1.343 (0.070)	0.587 (0.288)	0.370 (0.202)	0.000	0.000	0.000	0.014	0.243	-9.26	-2.83
11	0.233	0.562	0.306	0.145 (0.040)	0.727 (0.038)	0.128 (0.036)	0.674 (0.218)	1.293 (0.068)	0.595 (0.170)	0.373 (0.218)	0.000	0.000	0.000	0.001	0.415	-7.91	-2.73
7	0.258	0.551	0.263	0.192 (0.028)	0.790 (0.023)	0.018 (0.023)	0.688 (0.136)	1.433 (0.041)	0.649 (0.115)	0.394 (0.136)	0.000	0.001	0.001	0.022	0.213	-9.48	0.30
18	0.330	0.500	0.350	0.314 (0.043)	0.735 (0.037)	-0.050 (0.028)	0.516 (0.192)	1.470 (0.074)	0.680 (0.222)	0.405 (0.192)	0.000	0.000	0.000	0.173	0.932	-8.04	-1.17
10	0.342	0.500	0.354	0.304 (0.025)	0.673 (0.024)	0.024 (0.015)	0.458 (0.115)	1.346 (0.047)	0.735 (0.161)	0.424 (0.115)	0.000	0.000	0.000	0.000	0.120	-9.81	-1.58
16	0.361	0.473	0.306	0.317 (0.016)	0.647 (0.015)	0.036 (0.011)	0.488 (0.072)	1.367 (0.032)	0.778 (0.099)	0.438 (0.072)	0.000	0.000	0.000	0.000	0.000	-20.68	-1.87
15	0.275	0.551	0.263	0.186 (0.028)	0.766 (0.031)	0.049 (0.031)	0.715 (0.133)	1.389 (0.056)	0.816 (0.130)	0.449 (0.133)	0.000	0.000	0.012	0.020	0.742	-6.60	-1.24
20	0.353	0.467	0.350	0.292 (0.050)	0.722 (0.035)	-0.015 (0.041)	0.718 (0.195)	1.546 (0.074)	0.914 (0.214)	0.478 (0.195)	0.000	0.000	0.000	0.045	0.020	-7.04	0.67
19	0.297	0.533	0.354	0.185 (0.036)	0.785 (0.030)	0.030 (0.023)	0.848 (0.170)	1.472 (0.056)	1.004 (0.168)	0.501 (0.170)	0.000	0.000	0.000	0.042	0.325	-7.41	-0.36
17	0.331	0.526	0.400	0.240 (0.038)	0.711 (0.031)	0.049 (0.027)	0.629 (0.161)	1.353 (0.059)	1.077 (0.236)	0.519 (0.161)	0.000	0.000	0.000	0.018	0.004	-11.54	1.39
5	0.441	0.412	0.318	0.357 (0.037)	0.626 (0.025)	0.016 (0.037)	0.709 (0.118)	1.520 (0.060)	1.396 (0.195)	0.583 (0.118)	0.000	0.000	0.000	0.000	0.331	-8.23	-2.43

Regime $R = IC\text{-}PR$ [40% of industries, 27% of firms]

Ind. j	$(\alpha_N)_j$	$(\alpha_M)_j$	$(\alpha_K)_j$	$(\widehat{\varepsilon}_N^Q)_j$	$(\widehat{\varepsilon}_M^Q)_j$	$(\widehat{\varepsilon}_K^Q)_j$	$\widehat{\psi}_j$	$\widehat{\mu}_j$	*Sargan*	*Hansen*	*Dif-Hansen (lev)*	*Dif-Hansen (L2-dif)*	*Dif-Hansen (L3-dif)*	*m1*	*m2*
1	0.177	0.652	0.171	0.244 (0.040)	0.748 (0.035)	0.008 (0.027)	-0.230 (0.266)	1.148 (0.054)	0.000	0.000	0.000	0.008	0.520	-6.73	-2.32
3	0.180	0.603	0.218	0.171 (0.081)	0.743 (0.072)	0.085 (0.051)	0.281 (0550)	1.234 (0.119)	0.000	0.035	0.189	0.236	0.413	-3.84	-0.94
9	0.239	0.545	0.215	0.275 (0.045)	0.685 (0.066)	0.041 (0.030)	0.108 (0.302)	1.255 (0.121)	0.000	0.000	0.009	0.002	0.128	-5.88	-1.77
12	0.321	0.501	0.178	0.360 (0.069)	0.636 (0.058)	0.004 (0.053)	0.147 (0.304)	1.269 (0.116)	0.000	0.045	0.050	0.176	0.459	-3.90	-1.70
2	0.292	0.535	0.173	0.207 (0.020)	0.718 (0.023)	0.075 (0.021)	0.633 (0.100)	1.343 (0.044)	0.000	0.000	0.000	0.000	0.057	-6.25	-1.31
6	0.344	0.479	0.177	0.289 (0.052)	0.662 (0.059)	0.049 (0.046)	0.543 (0.252)	1.383 (0.124)	0.000	0.007	0.000	0.071	0.409	-5.08	-0.01
4	0.330	0.511	0.159	0.231 (0.036)	0.752 (0.030)	0.017 (0.031)	0.768 (0.150)	1.470 (0.058)	0.000	0.000	0.000	0.002	0.519	-8.15	-0.95
14	0.296	0.495	0.209	0.152 (0.037)	0.774 (0.032)	0.074 (0.025)	1.050 (0.178)	1.563 (0.065)	0.000	0.000	0.000	0.000	0.124	-8.42	-1.53

Notes: Robust standard errors in parentheses. Time dummies are included but not reported. *Sargan*, *Hansen*, *Dif-Hansen*: tests of overidentifying restrictions, asymptotically distributed as χ^2_{df}. p-values are reported. *Dif-Hansen* (*lev*) tests the validity of the 1-year lag of the first-differenced inputs as instruments in the levels equation while *Dif-Hansen* (*L2-dif*)/(*L3-dif*) test the validity of the 2-/3-year lags of the inputs as instruments in the first-differenced equation. $m1$ and $m2$: tests for first-order and second-order serial correlation in the first-differenced residuals, asymptotically distributed as $N(0,1)$. Industries within $R = PC\text{-}PR$ and $R = IC\text{-}PR$ are ranked according to $\widehat{\mu}_j$, industries within $R = IC\text{-}EB$ are ranked according to $\widehat{\phi}_j$.

Table A.4: Correlations between estimates of product and labor market imperfections by country

	$\rho_{\widehat{\mu}_j,\widehat{\gamma}_j}$	$\rho_{\widehat{\mu}_j,\widehat{\beta}_j}$
	CHILE	
All industries	0.657^{***} [0.679^{***}]	0.589^{***} [0.682^{**}]
$R = IC\text{-}EB$	1.000^{**} [0.481^{**}]	
	FRANCE	
All industries	0.826^{***} [0.801^{***}]	0.714^{***} [0.839^{***}]
$R = IC\text{-}EB$	0.685^{**} [0.766^{**}]	

Notes: Rank correlation is reported. A robust correlation is reported in square brackets.
***Significant at 1%, **Significant at 5%, *Significant at 10%.

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